

PATENT SPECIFICATION



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247,943

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COMPLETE SPECIFICATION.

Improvements in Crushing or Grinding Machines.

I, AMOS CAMPBELL HAMEY, of 10, Morden Street, North Sydney, in the State of New South Wales, Commonwealth of Australia, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in crushing or grinding machines, and has for its main object the construction of a machine suitable for either dry or wet grinding, whereby ore, tailings, or other material widely varying in size may be crushed and ground to any desired degree of fineness.

The invention comprises a base provided with a crushing and grinding plate, the said grinding plate being conical centrally and provided with a circumferential groove or grooves, over which a muller is revolvable, said muller having a corresponding working surface composed of a ridge or ridges oppositely shaped to that of the grinding plate. This muller is carried by an upwardly extending hollow shaft or tube, through which the material to be treated is fed between the muller and said plate. The hollow shaft or tube is revolvable in suitable bearings, and is driven by a drum or gearing secured to said shaft by vertical keys and keyways. Two or more brackets are positioned equidistantly to one another at the upper part of the tube, to which brackets are pivotally attached governor arms ending in suitable weights, which are adjustable on said arms to suit requirements. The inner ends of the governor arms terminate in toothed quadrants adapted to mesh with a correspondingly formed collar or cap provided on the upper end of the tube. A cam or the like positioned at the side of the tube is adapted to impart a vertical reciprocating

movement to the tube and muller for more effectively crushing and grinding the material against the plate.

For dry treatment, air under pressure, may be forced into a chamber above and around the muller and plate, the air and pulverised material being discharged through a suitable outlet or outlets.

For wet treatment, water is preferably forced through a central passage in the grinding plate, the outlet passage being divided or protected by a suitable cap.

I will now describe my invention with reference to the accompanying drawings, in which:—

Fig. 1, is a part sectional elevation of the complete machine, the automatic feed (hereinafter described) and muller being in the raised position, and

Figure 2, is a plan view on line 2—2, with the governor arms partly revolved for sake of clearness.

Figure 3, is a part elevation, on an enlarged scale, illustrating the automatic feed arrangements, the dotted lines representing the lowermost position.

Figure 4, is a part sectional elevation on an enlarged scale, of the cam and slide for raising the muller, and

Figure 5, is a sectional view on line 5—5, Figure 4.

Figure 6, is a sectional plan view of the hollow shaft or tube on line 6—6, Figure 1.

Figure 7, is a perspective view of the drag ring for very fine grinding.

The same numerals indicate like parts throughout the drawings.

9 is a base on which is keyed the crushing and grinding plate 10, provided with a conical portion 10^A, circumferential groove 10^B, a lip or ridge 10^C, and a grinding surface 10^D, either integral with or in the form of a separate circumferential ring. 11 is the muller with oppositely formed ridge 11^A and groove 11^B.

[Price 4s 6d.]

This muller is secured to the hollow shaft or tube 12, provided with keys 13 which connect it to the drum 22, revolving in bearings 14 and 15. Brackets 16 and 17 are secured to the tube 12, to which brackets the governor arms 18 and 19 are pivoted at 20 and 21 respectively. These arms 18 and 19 have adjustably positioned balls 23—23 secured thereon, in order to obtain a varied pressure for the treatment of different materials. The inner ends of these arms are provided with toothed quadrants 24 and 25, adapted to mesh with a grooved collar or cap 26 secured to the hollow shaft or tube 12. A ring 27 is provided to limit the downward movement of said tube in order to control the distance between the muller and the plate to obtain the degree of fineness in grinding. The drum 22 is revolved by the bevel pinion 28, meshing with the bevel wheel 29 secured to said drum, which bevel pinion is driven by the belt pulley 30 on the shaft 31.

The reciprocating movement of the muller 11 and tube 12 is effected by the slide 32 coming into contact with the cam face 33, both the slide and cam being provided with wearing surfaces 34 and 35 respectively. This slide 32 is operated by the member 36 being moved by the cam 37 revolved by the gear wheel 38, which is in turn driven by the gear wheels 39, 40 and 41.

The material is fed automatically and intermittently to the machine by means of a hopper 42 and an archimedian worm conveyor 43, driven by the pulley 44, which conveyor delivers the material into the funnel 45 attached to the upper end of the tube 12. An extension end or scoop 46 is pivoted at 47 to the end of the conveyor 43, which end is raised and lowered by the lever 48 provided with a roller 49 adapted to revolve on the cap or collar 26, in order that when the muller and tube are in the lowered position, the conveyor 43 will deliver material into this extension end so that no material will be fed to the machine while it is grinding. When the muller 11 is in the raised position, a further quantity of material will be delivered by the conveyor 43 as well as the material that has accumulated in the extension end 46 while it is in the lowered position.

The muller 11 is provided with keyways 50 into which keys 51 secured to a drag ring 52 are adapted to take, in order that said ring may be turned by the muller 11. This ring is preferably in two or more sections, suitably joined as at 53, the lower edge of each section being provided with vee shaped slots or openings 54 in order that a greater degree of fine-

ness may be obtained in grinding. A spring or springs may be provided to increase the grinding effect of the drag ring.

In wet treatment water or a suitable solution is fed to the machine with the material.

In dry treatment, I provide a blower 57 which delivers air under pressure, through the air pipe 58 to a chamber above the muller 11. This air helps to keep the muller cool as well as providing a means for discharging the finally ground material.

59 is a partition forming a closed-in chamber in which the crushing and grinding operation is carried out, the ground material being discharged into the pipe 60 through the wide mouthed portion 61.

In operation, material to be crushed and ground, is deposited into the hopper 42, and is fed by the worm conveyor 43 to the funnel 45, from whence it is deposited on to the crushing and grinding plate 10 by the hollow shaft or tube 12. The muller 11 is then revolved, the crushing force being obtained by the slide 32 being forced inwardly by the cam 37, which slide contacts with the cam 33 on the tube 12 and thereby raises said tube and muller. As soon as the cam 33 has passed over the slide 32, the tube and muller descend which action crushes the material on the plate 10. The grinding pressure is obtained by the governor arms 18 and 19 moving outwardly by centrifugal force thereby exerting a downward pressure on the tube 12 which causes the muller to grind the material between it and the plate 10. As the muller 11 revolves, it also turns the drag ring 52, the slots or openings 54 therein bringing the ground material to a very fine state of sub-division. The ground material is then discharged through the wide mouthed portion 61 and through pipe 60 and led to a suitable place for storage or further treatment.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In crushing or grinding machines, the combination with a base, and a rotatable and vertically reciprocable muller, of a plate supported on the base, said plate being conical centrally and provided with a circumferential groove or grooves, the working face of the muller having a correspondingly opposite ridge or ridges to said groove or grooves substantially as described.

2. In crushing or grinding machines

as claimed in Claim 1, the combination therewith of a hollow shaft, a grooved collar on said shaft, quadrants in engagement therewith and carried by pivotally mounted governor arms, to impart pressure to the muller, substantially as described.

3. In crushing or grinding machines as claimed in Claim 1, the combination with the muller of a drag ring provided with slots or openings for fine grinding substantially as described and as illustrated in Figure 7 of the drawings.

4. In crushing or grinding machines as claimed in Claim 2, the combination therewith of a conveyor, a pivoted extension portion thereon, and means actuated on the reciprocation of the hollow shaft to raise and lower said extension portion to deliver intermittently the material to the machine substantially as described.

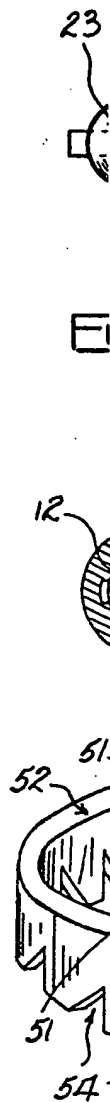
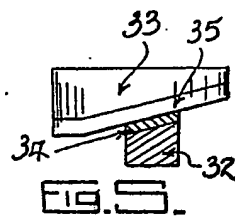
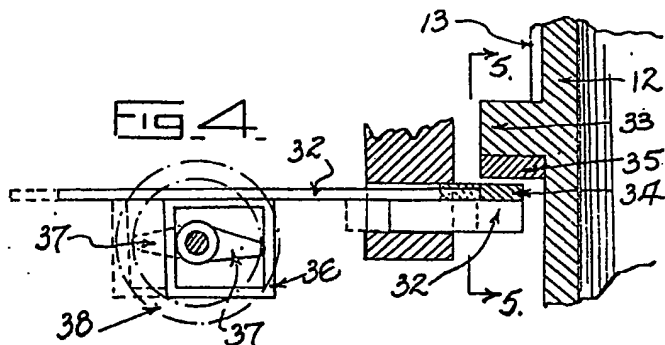
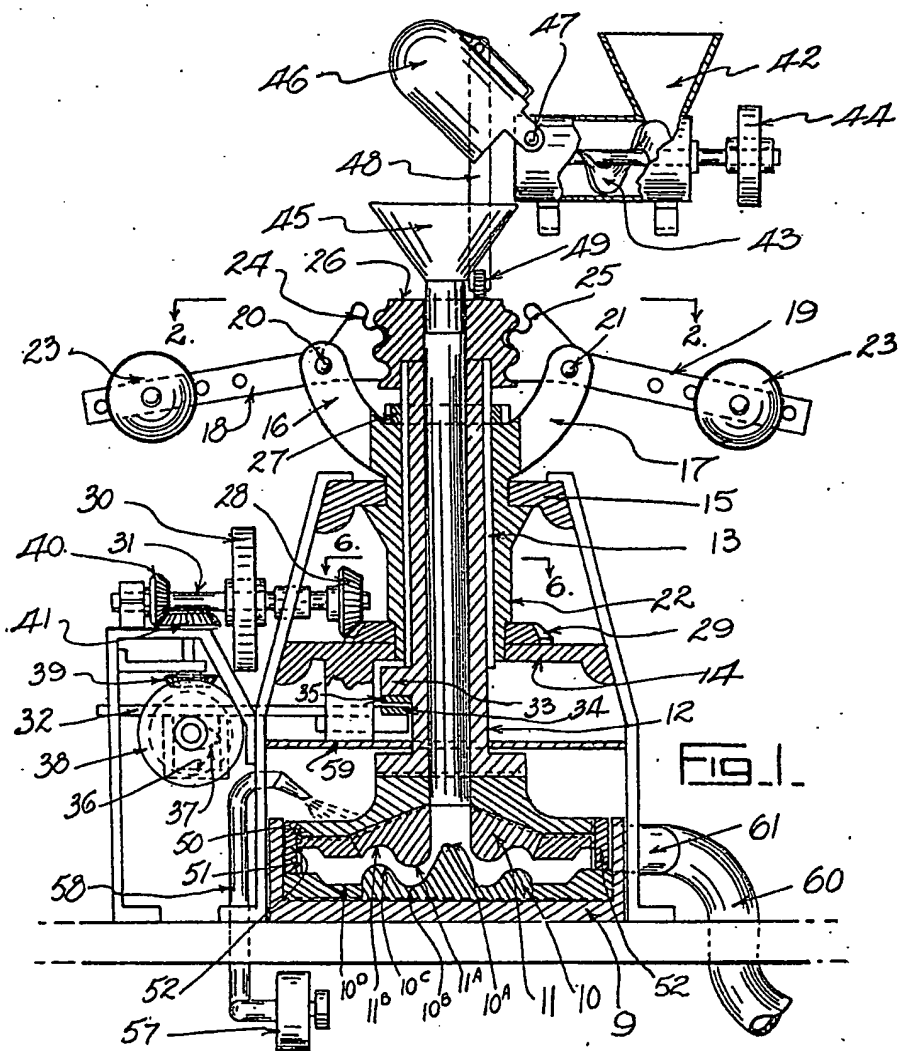
5. In crushing or grinding machines as claimed in the preceding claims, the combination therewith of an air injector whereby air under pressure is delivered to a chamber surrounding the crushing and grinding means, substantially as described and as illustrated in Figures 1 and 2 of the drawings.

6. The improved crushing or grinding machine consisting of the combination and arrangement of parts substantially as hereinbefore described with reference to and as illustrated in the drawings hereunto annexed.

Dated this 10th day of February, 1926.

TONGUE & BIRKBECK,
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W.C. 1,
Agents for the Applicant.

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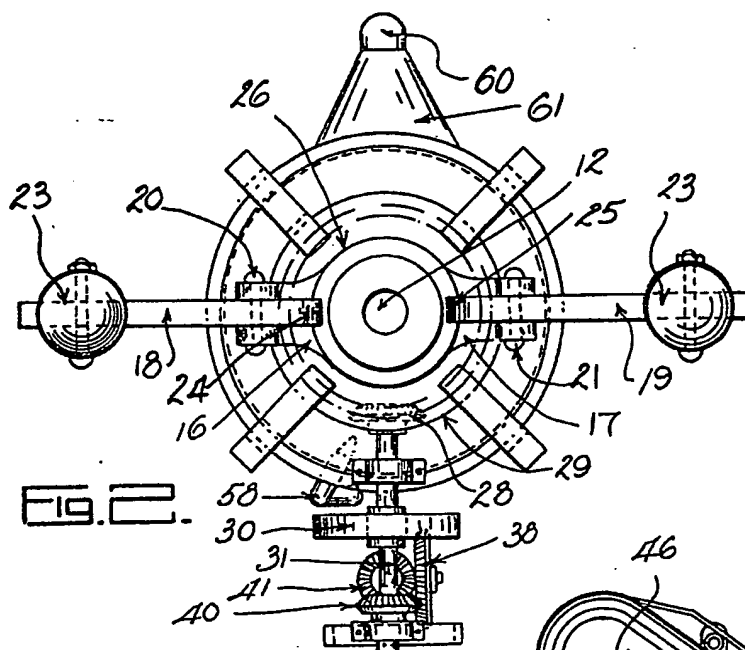


FIG. 2.

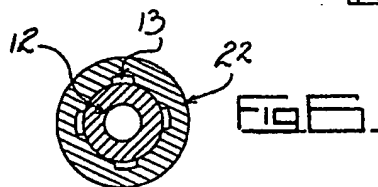


FIG. 6.

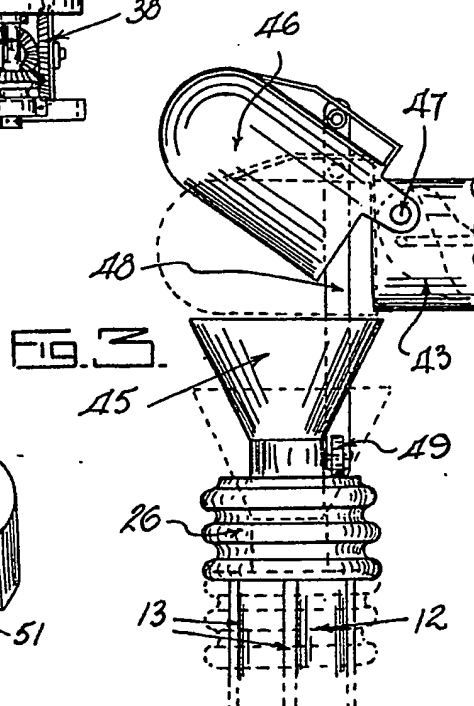


FIG. 3.

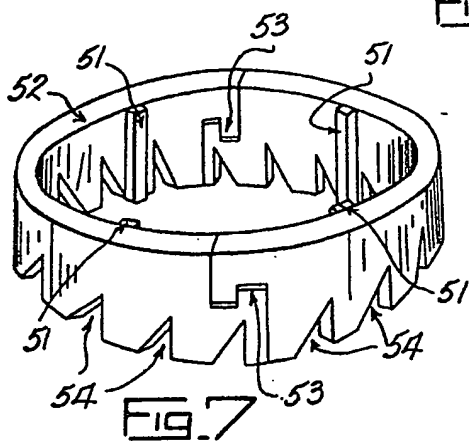
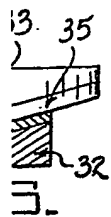


FIG. 7.

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